

CGHV27200 200 W, 2500-2700 MHz, GaN HEMT for LTE

Cree's CGHV27200 is a gallium nitride (GaN) high electron mobility transistor (HEMT) is designed specifically for high efficiency, high gain and wide bandwidth capabilities, which makes the CGHV27200 ideal for 2.5-2.7 GHz LTE and BWA amplifier applications. The transistor is input matched and supplied in a ceramic/metal flange package.



Package Type: 440162 and 440161 PN: CGHV27200F and CGHV27200P

Typical Performance Over 2.5 - 2.7 GHz ($T_c = 25^{\circ}c$) of Demonstration Amplifier

Parameter	2.5 GHz	2.6 GHz	2.7 GHz	Units
Gain @ 46 dBm	15.0	16.0	16.0	dB
ACLR @ 46 dBm	-36.5	-37.5	-37.0	dBc
Drain Efficiency @ 46 dBm	29.0	28.5	29.0	%

Note:

Measured in the CGHV27200-AMP amplifier circuit, under WCDMA 3GPP test model 1, 64 DPCH, 45% clipping, PAR = 7.5 dB @ 0.01% Probability on CCDF.

Features

- 2.5 2.7 GHz Operation
- 16 dB Gain
- -37 dBc ACLR at 40 W P_{AVE}
- 29 % Efficiency at 40 W P_{AVE}
- High Degree of DPD Correction Can be Applied





CREE 🔶

Absolute Maximum Ratings (not simultaneous) at 25°C Case Temperature

Parameter	Symbol	Rating	Units	Conditions
Drain-Source Voltage	V _{DSS}	125	Volts	25°C
Gate-to-Source Voltage	V _{gs}	-10, +2	Volts	25°C
Storage Temperature	T _{stg}	-65, +150	°C	
Operating Junction Temperature	Tj	225	°C	
Maximum Forward Gate Current	GMAX	32	mA	25°C
Maximum Drain Current ¹	I _{DMAX}	12	А	25°C
Soldering Temperature ²	Τ _s	245	°C	
Screw Torque	τ	80	in-oz	
Thermal Resistance, Junction to Case ³	$R_{_{ ext{ hetaJC}}}$	1.22	°C/W	85°C, P _{DISS} = 96 W
Thermal Resistance, Junction to Case ⁴	R _{eJC}	1.54	°C/W	85°C, P _{DISS} = 96 W
Case Operating Temperature ⁵	T _c	-40, +150	°C	

Note:

¹ Current limit for long term, reliable operation.

² Refer to the Application Note on soldering at <u>http://www.cree.com/rf/document-library</u>

³ Measured for the CGHV27200P

⁴ Measured for the CGHV27200F

⁵ See also, the Power Dissipation De-rating Curve on Page 6

Electrical Characteristics ($T_c = 25^{\circ}C$)

					1	
Characteristics	Symbol	Min.	Тур.	Max.	Units	Conditions
DC Characteristics ¹						
Gate Threshold Voltage	$V_{\rm GS(th)}$	-3.8	-3.0	-2.3	V _{DC}	$V_{_{\rm DS}}$ = 10 V, I $_{_{\rm D}}$ = 32 mA
Gate Quiescent Voltage	V _{GS(Q)}	-	-2.7	-	V _{DC}	$V_{\rm DS}$ = 50 V, I _D = 1.0 A
Saturated Drain Current ²	I _{DS}	24	28.8	-	А	$V_{_{ m DS}}$ = 6.0 V, $V_{_{ m GS}}$ = 2.0 V
Drain-Source Breakdown Voltage	V _{BR}	150	-	-	V _{DC}	$V_{_{\rm GS}}$ = -8 V, I $_{_{\rm D}}$ = 32 mA
RF Characteristics ⁵ ($T_c = 25^{\circ}C$, $F_0 = 2.7$ GH:	z unless otherwi	se noted)				
Saturated Output Power ^{3,4}	P _{SAT}	-	300	-	W	V _{DD} = 50 V, I _{DQ} = 1.0 A
Pulsed Drain Efficiency ³	η	-	62	-	%	V_{DD} = 50 V, I_{DQ} = 1.0 A, P_{out} = P_{sat}
Gain ⁶	G	-	15.25	-	dB	$V_{_{DD}}$ = 50 V, I $_{_{DQ}}$ = 1.0 A, $P_{_{OUT}}$ = 46 dBm
WCDMA Linearity6	ACLR	-	-37	-	dBc	$V_{_{DD}}$ = 50 V, I $_{_{DQ}}$ = 1.0 A, $P_{_{OUT}}$ = 46 dBm
Drain Efficiency ⁶	η	-	30.5	-	%	$V_{_{DD}}$ = 50 V, I $_{_{DQ}}$ = 1.0 A, $P_{_{OUT}}$ = 46 dBm
Output Mismatch Stress ³	VSWR	-	-	10:1	Ψ	No damage at all phase angles, V $_{\rm DD}$ = 50 V, I $_{\rm DQ}$ = 1.0 A, P $_{\rm OUT}$ = 200 W Pulsed
Dynamic Characteristics						
Input Capacitance ⁷	C _{GS}	-	97	-	pF	$V_{_{DS}}$ = 50 V, $V_{_{gs}}$ = -8 V, f = 1 MHz
Output Capacitance7	C _{DS}	-	13.4	-	pF	$V_{_{DS}}$ = 50 V, $V_{_{gs}}$ = -8 V, f = 1 MHz
Feedback Capacitance	C _{gD}	-	0.94	-	pF	$V_{_{DS}}$ = 50 V, $V_{_{gs}}$ = -8 V, f = 1 MHz

Notes:

¹ Measured on wafer prior to packaging.

² Scaled from PCM data.

 3 Pulse Width = 100 μ S, Duty Cycle = 10%

 4 P_{SAT} is defined as I_G = 3 mA peak.

⁵ Measured in CGHV27200-AMP.

⁶ Single Carrier WCDMA, 3GPP Test Model 1, 64 DPCH, 45% Clipping, PAR = 7.5 dB @ 0.01% Probability on CCDF.

⁷ Includes package and internal matching components.

Copyright © 2014-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree and the Cree logo are registered trademarks of Cree, Inc.

Cree, Inc. 4600 Silicon Drive Durham, North Carolina, USA 27703 USA Tel: +1.919.313.5300 Fax: +1.919.869.2733 www.cree.com/rf











Copyright © 2014-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree and the Cree logo are registered trademarks of Cree, Inc.

Cree, Inc 4600 Silicon Drive Durham, North Carolina, USA 27703 USA Tel: +1.919.313.5300 Fax: +1.919.869.2733 www.cree.com/rf









Copyright © 2014-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree and the Cree logo are registered trademarks of Cree, Inc.

Cree, Inc. 4600 Silicon Drive Durham, North Carolina, USA 27703 USA Tel: +1.919.813.5300 Fax: +1.919.869.2733 www.cree.com/rf









Copyright © 2014-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree and the Cree logo are registered trademarks of Cree, Inc.

Cree, Inc. 4600 Silicon Drive Durham, North Carolina, USA 27703 USA Tel: +1,919.313.5300 Fax: +1,919.869.2733 www.cree.com/rf

CGHV27200 Rev 1.0







Copyright © 2014-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree and the Cree logo are registered trademarks of Cree, Inc.

Cree, Inc. 4600 Silicon Drive Durham, North Carolina, USA 27703 USA Tel: +1.919.313.5300 Fax: +1.919.869.2733 www.cree.com/rf

CGHV27200 Rev 1.0



Source and Load Impedances



Frequency (MHz)	Z Source	Z Load
2500	11.14 - j14.20	4.66 - j0.69
2550	9.58 - j14.73	4.51 - j0.92
2600	7.99 - j14.81	4.30 - j1.12
2650	6.53 - j14.52	4.02 - j1.27
2700	5.28 - j13.97	3.70 - j1.36

Note¹: V_{DD} = 50 V, I_{DQ} = 1.0 A. In the 440162 package. Note²: Impedances are extracted from CGHV27200-AMP demonstration circuit and are not source and load pull data derived from transistor.

Copyright © 2014-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree and the Cree logo are registered trademarks of Cree, Inc.

Cree, Inc. 4600 Silcon Drive Durham, North Carolina, USA 27703 USA Tel: +1.919.313.5300 Fax: +1.919.869.2733 www.cree.com/rf



CGHV27200-AMP Demonstration Amplifier Circuit Schematic



CGHV27200-AMP Demonstration Amplifier Circuit Outline



Copyright © 2014-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree and the Cree logo are registered trademarks of Cree, Inc.

Cree, Inc. 4600 Silicon Drive Durham, North Carolina, USA 27703 USA Tel: +1.919.313.5300 Fax: +1.919.869.2733 www.cree.com/rf

CGHV27200 Rev 1.0



CGHV27200-AMP Demonstration Amplifier Circuit Bill of Materials

Designator	Description	Qty
R1	RES, 1/16 W, 0603, 1%, 150 OHMS	1
R2	RES, 1/16 W, 0603, 1%, 5.1 OHMS	1
C1	CAP, 6.2 pF, +/-0.25 pF, 0603, ATC600S	1
C2	CAP, 27 pF, +/-5%, 0603, ATC600S	1
C3,C9,C15	CAP, 8.2 pF, +/-0.25 pF, 0603, ATC600S	3
C4,C10	CAP, 82.0 pF, +/-5%, 0603, ATC600S	2
C5,C11	CAP, 470 pF, 5%, 100 V, 0603, X7R	2
C6,C12,C16	CAP, 33000 pF, 0805, 100 V, X7R	3
C7	CAP, 10 UF, 16V, TANTALUM	1
C8	CAP, 27 pF, +/-5%, 250 V, 0603, ATC600S	1
C13,C17	CAP, 1.0 UF, 100 V, 10%, X7R, 1210	2
C14	CAP, 100 UF, +/-20%, 160V, ELECTROLYTIC	2
C18	CAP, 33 UF, 20%, G CASE	1
J1,J2	CONN, SMA, PANEL MOUNT JACK, FLANGE, 4-HOLE, BLUNT POST	2
J3	CONN, Header, RT> PLZ, 0.1 CEN, LK, 9 POS	1
	PCB, R04350, 0.020" THK, CGHV27200	1
	2-56 SOC HD SCREW 1/4 SS	4
	#2 SPLIT LOCKWASHER SS	4
	CGHV27200	1

CGHV27200-AMP Demonstration Amplifier Circuit



Copyright © 2014-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree and the Cree logo are registered trademarks of Cree, Inc.

Cree, Inc. 4600 Silicon Drive Durham, North Carolina, USA 27703 USA Tel: +1.919.313.5300 Fax: +1.919.869.2733 www.cree.com/rf



Product Dimensions CGHV27200F (Package Type – 440162)



NOTES:

- 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- 2. CONTROLLING DIMENSION: INCH.
- 3. ADHESIVE FROM LID MAY EXTEND A MAXIMUM OF 0.020" BEYOND EDGE OF LID.
- LID MAY BE MISALIGNED TO THE BODY OF THE PACKAGE BY A MAXIMUM OF 0.008" IN ANY DIRECTION.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	.395	.405	10.03	10.29
В	.580	.620	14.73	15.75
С	.380	.390	9.65	9.91
D	.055	.065	1.40	1.65
E	.004	.006	0.10	0.15
F	.055	.065	1.40	1.65
G	.275	.285	6.99	7.24
н	.595	.605	15.11	15.37
J	.395	.405	10.03	10.29
к	.129	.149	3.28	3.78
L	.053	.067	1.35	1.70
м	.795	.805	20.19	20.45

PIN 1. GATE PIN 2. DRAIN PIN 3. SOURCE

Product Dimensions CGHV27200P (Package Type - 440161)



NOTES:

А

- 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- 2. CONTROLLING DIMENSION: INCH.
- 3. ADHESIVE FROM LID MAY EXTEND A MAXIMUM OF 0.020" BEYOND EDGE OF LID.
- LID MAY BE MISALIGNED TO THE BODY OF PACKAGE BY A MAXIMUM OF 0.008" IN ANY DIRECTION.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
А	.395	.407	10.03	10.34
В	.594	.634	15.09	16.10
С	.395	.407	10.03	10.34
D	.275	.285	6.99	7.24
E	.395	.407	10.03	10.34
F	.129	.149	3.28	3.78
G	.004	.006	0.10	0.15
н	.057	.067	1.45	1.70

Copyright © 2014-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree and the Cree logo are registered trademarks of Cree, Inc.

Cree, Inc. 4600 Silicon Drive Durham, North Carolina, USA 27703 USA Tel: +1.919.313.5300 Fax: +1.919.869.2733 www.cree.com/ff



Product Ordering Information

Order Number CGHV27200F	Description GaN HEMT	Unit of Measure Each	Image
CGHV27200P	GaN HEMT	Each	CREE SOUP CCHU27200P CCEHU27200P
CGHV27200-TB	Test board without GaN HEMT	Each	
CGHV27200-AMP	Test board with GaN HEMT installed	Each	

Copyright © 2014-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree and the Cree logo are registered trademarks of Cree, Inc.

Cree, Inc. 4600 Silicon Drive Durham, North Carolina, USA 27703 USA Tel: +1.919.313.5300 Fax: +1.919.869.2733 www.cree.com/rf

11 CGHV27200 Rev 1.0

CREE ᆃ

Disclaimer

Specifications are subject to change without notice. Cree, Inc. believes the information contained within this data sheet to be accurate and reliable. However, no responsibility is assumed by Cree for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Cree. Cree makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose. "Typical" parameters are the average values expected by Cree in large quantities and are provided for information purposes only. These values can and do vary in different applications and actual performance can vary over time. All operating parameters should be validated by customer's technical experts for each application. Cree products are not designed, intended or authorized for use as components in applications intended for surgical implant into the body or to support or sustain life, in applications in which the failure of the Cree product could result in personal injury or death or in applications for planning, construction, maintenance or direct operation of a nuclear facility.

For more information, please contact:

Cree, Inc. 4600 Silicon Drive Durham, North Carolina, USA 27703 www.cree.com/rf

Sarah Miller Marketing Cree, RF Components 1.919.407.5302

Ryan Baker Marketing & Sales Cree, RF Components 1.919.407.7816

Tom Dekker Sales Director Cree, RF Components 1.919.407.5639

> Cree, Inc. 4600 Silicon Drive Durham, North Carolina, USA 27703 USA Tel: +1.919.313.5300 Fax: +1.919.869.2733 www.cree.com/rf

Copyright © 2014-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree and the Cree logo are registered trademarks of Cree, Inc.